reference to Fig. 2. In this case the outer screen of the cable should be connected to the passage lining 16 at two, preferably more, spaced apart locations.

In most applications the antenna is enclosed in a protective envelope which is typically a thin plastics cover surrounding the antenna either with or without an intervening space.

What is claimed is:-

1. An antenna for operation at a frequency in excess of 200 MHz, comprising an electrically insulative antenna core of a material having a relative dielectric constant greater than 5, a three-dimensional antenna element structure disposed on or adjacent the outer surface of the core and defining an interior volume, and a feeder structure which is connected to the element structure and passes through the core, the material of the core occupying the major part of the said interior volume.

2. An antenna according to claim 1, wherein the antenna element structure comprises a plurality of antenna elements defining an envelope centred on a central longitudinal axis of the antenna, and wherein the feeder structure is coincident with the said axis.

3. An antenna according to claim 2, wherein the core is a cylinder and the antenna elements define a cylindrical envelope which is coaxial with the core.

4. An antenna according to claim 2, wherein the core is a cylindrical body which is solid with the exception of an axial passage housing the feeder structure.

5. An antenna according to claim 4, wherein the volume of the solid material of the core is at least 50 per cent of the internal volume of the envelope defined by the elements, with the elements lying on an outer cylindrical surface of the core.

6. An antenna according to claim 2, wherein the elements comprise metallic conductor tracks bonded to the core outer surface.

7. An antenna according to claim 1, wherein the material of the core is a ceramic.

8. An antenna according to claim 7, wherein the relative dielectric constant of the material is greater than 10.

9. An antenna according to claim 1, having a cylindrical core of solid material with an axial extent at least as great as its outer diameter, and with the diametrical extent of the solid material being at least 50 per cent of the outer diameter.

10. An antenna according to claim 9, wherein the core is in the form of a tube having an axial passage of a diameter less than a half of its overall diameter, the inner passage having a conductive lining.

11. An antenna according to claim 9, wherein the antenna element structure comprises a plurality of generally helical antenna elements formed as metallic tracks on the outer surface of the core which are generally co-extensive in the axial direction.

12. An antenna according to claim 11, wherein each helical element is connected to the feeder structure at one of its ends and to a ground or virtual ground conductor at its other end, and wherein the connections to the feeder structure are made with generally radial conductive elements, the ground conductor being common to all of the helical elements.

13. An antenna for operation at a frequency in excess of 200 MHz, comprising a solid electrically insulative antenna core which has a central longitudinal axis and is made of a material having a relative dielectric constant greater than 5, a feeder structure extending through the core on the outer surface of the core, a plurality of antenna elements which are connected to the feeder structure at one end of the core and extend in

the direction of the opposite end of the core to a common grounding conductor.

14. An antenna according to claim 13, wherein the core has a constant external cross-section in the axial direction, with the antenna elements being conductors plated on the surface of the core.

15. An antenna according to claim 14, wherein the antenna elements comprise a plurality of conductor elements extending longitudinally over the portion of the core having a constant external cross-section, and a plurality of radial conductor elements connecting the longitudinally extending elements to the feeder structure at the said one end of the core.

16. An antenna according to claim 15, including an integral balun formed by a conductive sleeve extending over part of the length of the core from a connection with the feeder structure at the said opposite end of the core.

17. An antenna according to claim 16, wherein the balun sleeve forms the common grounding conductor for the longitudinally extending conductor elements, and wherein the feeder structure comprises a coaxial line having an inner conductor and an outer screen conductor, the conductive sleeve of the balun being connected at the said opposite end of the core to the feeder structure outer screen conductor.

18. An antenna according to claim 13, wherein the core is a solid cylinder, and wherein the antenna elements comprise at least four longitudinally extending elements on the cylindrical outer surface of the core and corresponding radial elements on a distal end face of the core connecting the longitudinally extending elements to the conductors of the feeder structure.

19. An antenna according to claim 18, wherein the longitudinally extending elements are of different lengths.

20. An antenna according to claim 19, wherein the antenna elements comprise four longitudinally extending elements, two of which are of greater length than the other two by virtue of following meandered paths on the outer surface of the core.

21. An antenna according to claim 20, wherein each of the four longitudinally extending elements follow a respective generally helical path, the longer of the two elements each following a respective meandering course which deviates to either side of a helical centre line.

22. An antenna according to claim 18, wherein the radial elements are simple radial tracks which are all the same length.

23. An antenna according to claim 13, having a plurality of antenna element with a longitudinal extent in the range of from 0.03λ to 0.06λ, the core diameter being in the range of from 0.02λ to 0.03λ, where λ is the operating wavelength of the antenna in air.

24. An antenna according to claim 23 and claim 16, wherein the length of the balun sleeve is in the range of from 0.03λ to 0.06λ.

25. An antenna for operation at a frequency in excess of 200 MHz, comprising an antenna element structure in the form of at least two pairs of helical elements formed as helices having a common central axis, a substantially axially located feeder structure having an inner feed conductor and an outer screen conductor with each helical element having one end coupled to a distal end of the feeder structure and its other end connected to a common grounding conductor, and

a balun comprising a conductive sleeve located coaxially around the feeder structure, the sleeve being spaced from the outer screen of the feeder structure by a coaxial layer of insulative material having a relative dielectric constant greater than 5, with the proximal end of the sleeve connected to the feeder structure outer screen.

26. An antenna according to claim 25, wherein the sleeve conductor of the balun forms the common grounding conductor, with each helical element terminating at a distal edge of the sleeve.

27. An antenna according to claim 25, wherein the distal edge of the sleeve is open circuit, and the common grounding conductor is the outer screen of the feeder structure.

28. Radio communication apparatus having an antenna according to claim 13, wherein the antenna is mounted directly on a printed circuit board forming part of the apparatus.

29. A method of manufacturing an antenna as claimed according to claim 13, comprising forming the antenna core from the dielectric material, metallising the external surfaces of the core according to a predetermined pattern.

30. A method according to claim 29, wherein the metallisation step includes coating the external surfaces of the core with a metallic material and removing portions of the coating to leave the predetermined pattern.

31. A method according to claim 29, wherein the metallisation step includes forming a mask containing a negative of the said predetermined pattern and depositing a metallic material on the external surfaces of the core while using the mask to mask portions of the core so that the

metallic material is applied according to the predetermined pattern.

32. A method of manufacturing a plurality of antennas as claimed in claim 16 comprising:-

providing a batch of the dielectric material;

making from the batch at least one test antenna core;

forming a balun structure by metallising on the core a balun sleeve having a predetermined nominal dimension which affects the frequency of resonance of the balun structure;

measuring the resonant frequency to derive an adjusted value of the balun sleeve dimension for obtaining a required balun structure resonant frequency, and to derive at least one dimension for the antenna elements giving a required antenna elements frequency characteristic; and

manufacturing from the same batch of material a plurality of antennas with a balun sleeve and antenna elements having the derived dimensions.

33. A method according to claim 32, wherein the test core is cylindrical and is made with an axial passage, and the passage is metallised over a section thereof which is coextensive with the balun sleeve.

34. A method according to claim 32, wherein the test core is cylindrical and is made with an axial passage, and the passage is metallised over the whole of its length.

35. A method according to claim 33 or claim 34, wherein the said sleeve dimension is its axial length.

36. A method according to claim 33 or claim 34, wherein the said dimension for the antenna elements is the length of at least some of the antenna elements.

37. A method according to claim 33 or claim 34, wherein the said dimension for the antenna elements is the axial extent

of the antenna elements, the said axial extent being the same for each of the antenna elements.

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